

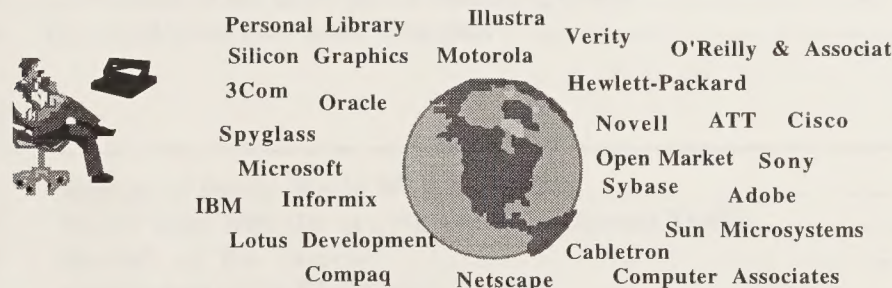
Industry Analysis

The World Wide Web

Globally Connected, Plain and Simple!

The World Wide Web is where the action is on the Internet and the opportunities are widespread. Using the Internet as its backbone, this much discussed electronic communication medium is becoming the tool of choice for many organizations to go on-line. The potential market for those participating in the Web is as large as the Internet, which has about 30 million users. With its global reach and support for text, audio, graphics, and video, it is an attractive mechanism for supporting many academic, research, entertainment, electronic publishing, and commercial activities. *Institutional Investor* (April 1995) has discussed the Web as a way for investor relations departments to go online.

This report provides an overview of many firms' initiatives to leverage the World Wide Web with their products and services.



The growth of the Web is dramatic. In June 1994, there were 600 public Web sites that accounted for 5% of global Internet traffic. Today 16,000 sites account for approximately 20% of Internet traffic, and we believe Web activity will grow to 40% by year-end 1995. This growth is causing many firms to update their product development plans to accommodate the Web.

The World Wide Web is dramatically changing the way information is shared and accessed. We believe that as Web software evolves it may become the global architecture to pursue electronic messaging, workflow, and interactive multimedia activities. Online services are striving to accommodate the Web, and new markets are being created for companies that can help navigate through this sea of information.

The Web provides a world of possibilities for pursuing content and commerce: No longer is it just for "technologists." With an increasing variety of services, the Web has gone mainstream. Numerous companies in a broad range of businesses have established sites providing public access to the Web. Services are now available for obtaining daily stock quotes and SEC documents, as well as music and video clips. Increasingly, the Web will be used for electronic commerce and to provide customer service and support.

Note: This report is available on J.P. Morgan's World Wide Web server. The address is www.jpmorgan.com, under "Products & Services," "Industry Research." All companies and organizations appearing in ***Bold Italic*** in the report represent "hypertext" links to other sites. Therefore, by clicking on that text you will be connected with other Web sites. Our report links to over 100 companies and organizations. The report can also be downloaded in Adobe Acrobat format. J. P. Morgan has not reviewed and is not responsible for any of the material or information posted at the linked sites by the companies or organizations cited in the report.

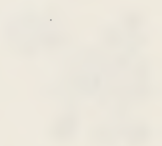
ASTOR LENOX TILDEN FOUNDATION

The World Wide Web

Classical Concerts and Songs

The first of the series of classical concerts and songs was given on the evening of the 14th inst. at the New York Public Library. The program was most excellent and the performance was of a high order. The concert was given by the New York Public Library and the Astor Lenox Tilden Foundation. The program was most excellent and the performance was of a high order. The concert was given by the New York Public Library and the Astor Lenox Tilden Foundation.

The concert was given by the New York Public Library and the Astor Lenox Tilden Foundation. The program was most excellent and the performance was of a high order. The concert was given by the New York Public Library and the Astor Lenox Tilden Foundation.



The concert was given by the New York Public Library and the Astor Lenox Tilden Foundation. The program was most excellent and the performance was of a high order. The concert was given by the New York Public Library and the Astor Lenox Tilden Foundation.

The concert was given by the New York Public Library and the Astor Lenox Tilden Foundation. The program was most excellent and the performance was of a high order. The concert was given by the New York Public Library and the Astor Lenox Tilden Foundation.

The concert was given by the New York Public Library and the Astor Lenox Tilden Foundation. The program was most excellent and the performance was of a high order. The concert was given by the New York Public Library and the Astor Lenox Tilden Foundation.

The concert was given by the New York Public Library and the Astor Lenox Tilden Foundation. The program was most excellent and the performance was of a high order. The concert was given by the New York Public Library and the Astor Lenox Tilden Foundation.

The concert was given by the New York Public Library and the Astor Lenox Tilden Foundation. The program was most excellent and the performance was of a high order. The concert was given by the New York Public Library and the Astor Lenox Tilden Foundation.

TABLE OF CONTENTS

Read This Report Because	3
The Impact of the World Wide Web	4
World Wide Web 101: How Does It Work?	6
The Browser Marketplace	7
The Software Industry Reacts	8
Getting Connected: The Access Providers	10
Finding What You Need: Information Retrieval	11
The Electronic Commerce Game	12
The Content Is the Thing	13

TABLES


Table 1: Software Developers Address the Web Market	9
Table 2: Online Access Providers Connect to the Web	10
Table 3: Companies in the Information Searching Game	11
Table 4: Competitors in Electronic Commerce	12

CHARTS

Chart 1: Number of Public World Wide Web Sites	4
Chart 2: World Wide Web Use as a Percentage of Internet Traffic	5
Chart 3: Growth of the Internet	5
Chart 3: Architecture of the World Wide Web	6
Chart 4: The World Wide Web Reaches Out	8
Chart 5: A World of Possibilities	13

APPENDICES

Appendix I: A Sampling of Technology Companies on the Web	14
Appendix II: A Few Other Interesting Sites on the Web	18
Appendix III: Terms to Know	19



Digitized by the Internet Archive
in 2023 with funding from
Kahle/Austin Foundation

<https://archive.org/details/industryanalysis00jpmo>

READ THIS REPORT BECAUSE . . .

The World Wide Web is where the action is on the Internet. Yes, the Internet supports a variety of activities, such as electronic mail and bulletin boards, but none has grabbed the attention of the marketplace so dramatically as the Web. Usage is on the rise, products extending its capabilities are rapidly coming to market, and many market research activities are under way to identify commercial opportunities for this global information service.

The World Wide Web is the global information-sharing architecture for the Internet. Uses of the Web include support for online encyclopedias, product catalogs, weather information, publishing company product announcements financial results, and employment opportunities, to name just a few. As the Web's technology evolves, there will be increasing use of audio and video, 3-D animation, and access to external databases. The Web is altering many of the fundamentals of the information technology market.

Opportunities are widespread. Some of the areas being pursued by many public and private companies are: 1) providing access to the Web and the Internet and tools to build Web applications; 2) consulting on how to operate on the Web; 3) establishing electronic malls; and 4) providing technologies which locate relevant information and services in this global library.

The market's dynamics are significant. New uses and products related to the Web are announced daily. This is a hot market, and many firms are initiating products and services to address its needs. However, we believe that revenue growth estimates for this market can be speculative at this time because: 1) the Web itself is still in a very early stage of deployment; 2) pricing of commercial offerings is in flux; and 3) business plans are in the development stage.

This report provides an overview. "World Wide Web 101: How Does It Work?" is a basic primer on the architecture of the Web (see page 6). We have taken a broad view of the Web's impact on the marketplace, and we discuss activities related to the development of software products, changes for online services, and the impact on electronic commerce.

The major players in this market are profiled. This report lists the participants and their market capitalizations if public, and it briefly outlines their product focuses and recent developments. The number and breadth of companies involved preclude a thorough analysis here of each one's prospects.

Don't be intimidated. The Web is based on distributed (it's global), heterogeneous (supporting a wide array of hardware and software), client/server (workstations requesting information from servers) technology. If you consider yourself non-technical, then the body of this report is for you. It explains the Web's technology in non-technical terms (with pictures, of course). After reading the report, we hope investors will: 1) be comfortable with the technical jargon (see Appendix III for terms you don't know); 2) understand the realities of the Web; and 3) appreciate the business trends affecting this market.

Profiles of technology players now participating on the Web are listed in Appendix I

THE IMPACT OF THE WORLD WIDE WEB

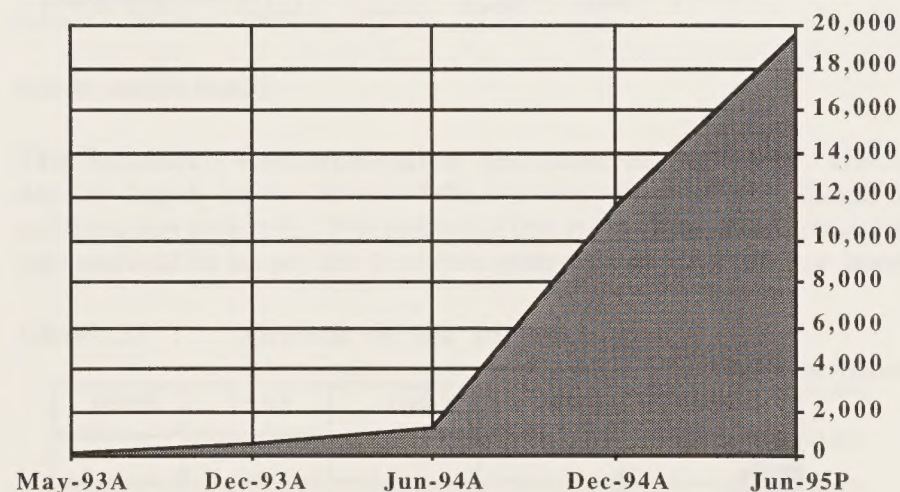


The World Wide Web is an important advance in the areas of publishing, communication, and commerce. Before the Web's introduction, using the Internet was difficult, requiring technical skill and patience. The introductions of and improvements to authoring tools (which create content) and browser software (which provides access to Web sites) have made it easy to instantaneously share information containing text, audio, and video clips with a global community. This type of information delivery is unprecedented, and its effect is dramatically reshaping how we all will interact in the global economy.

The Web is causing dramatic changes in information technology product offerings. It is estimated that more than 16,000 Web sites are now accessible to the general public, up from 2,000 in June 1994. This growth has caught the attention of software developers, online information providers, and Internet access providers, along with many in the media field. As a result, many new products and service offerings now address the Web marketplace.

Chart 1 presents the Web's dramatic growth. The availability of Mosaic-based browsers (described below), introduced in June 1994 had a profound effect, escalating the growth.

Chart 1: Number of Public World Wide Web Sites

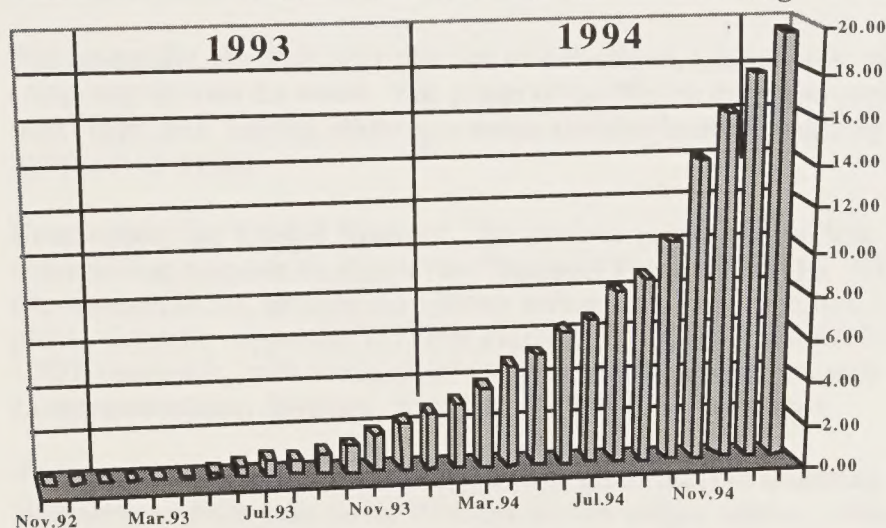


Source: Wander (Matthew Gray) and J.P. Morgan Securities Inc.

As a global, multimedia information system, the Web is in its infancy. We can think of its status today as Web version 1.0. Many Web documents today still consist of text, with a few graphics to increase their visual appeal. As the Web evolves and we understand more about this environment's capabilities and implications, more extensive use of pictures, sound, video, and interactivity will be incorporated. Technology for supporting real-time data is being introduced by *Netscape Communications Corp.*; 3-D visualization is being pursued by *Sun Microsystems* and *Silicon Graphics*; formatting capabilities are being enhanced by *Adobe Systems*; and broadcast audio will be supported *Progressive Networks*.

Drivers of Growth: The Web's growth is attributable to a number of factors, including: 1) its ease of use; 2) the wide access to it from the Internet; 3) the availability of content addressing a wide array of interests and needs; and 4) its design, which supports the publishing of multimedia documents and hypertext linking. **As presented in Chart 2, by the end of 1994, Internet traffic attributed to individuals accessing Web sites had grown to 20%, and we believe that this figure could reach 40% by year-end 1995.**

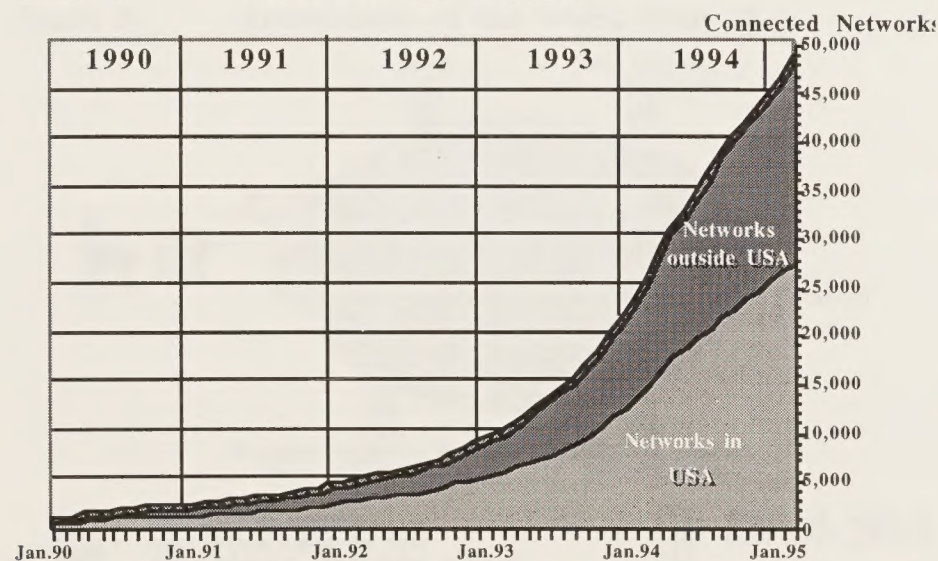
Chart 2: World Wide Web Use as a Percentage of Internet Traffic



Source: Internet Society

The Internet - Communication Backbone of the Web: The success of the Web depends largely on the success of the Internet, which provides the infrastructure for the Web's software and protocols. It is estimated that more than 30 million people use the Internet. International in scope, the Internet's **growth rate of 12% per month** is significant.

Chart 3: Growth of the Internet



Source: [ftp://nic.merit.edu/statistics/nsfnet](http://nic.merit.edu/statistics/nsfnet).

WORLD WIDE WEB 101: HOW DOES IT WORK?

The Web was developed to simplify the use and navigation of the Internet for the average user. Its development started at the European Center for Particle Physics (known as **CERN**) in 1989 to provide a way for scientists to share documents over the Internet. This effort was led by Tim Berners-Lee, who is now with MIT and directs the W3 Consortium, which coordinates the development of Web standards.

Fundamentally, the Web is a collection of documents, referred to as "pages," located on computers all over the world. The power of the Web is that these pages can be connected with "hypertext" linking, allowing a reader to move between pages by clicking on the linked hypertext on a page.

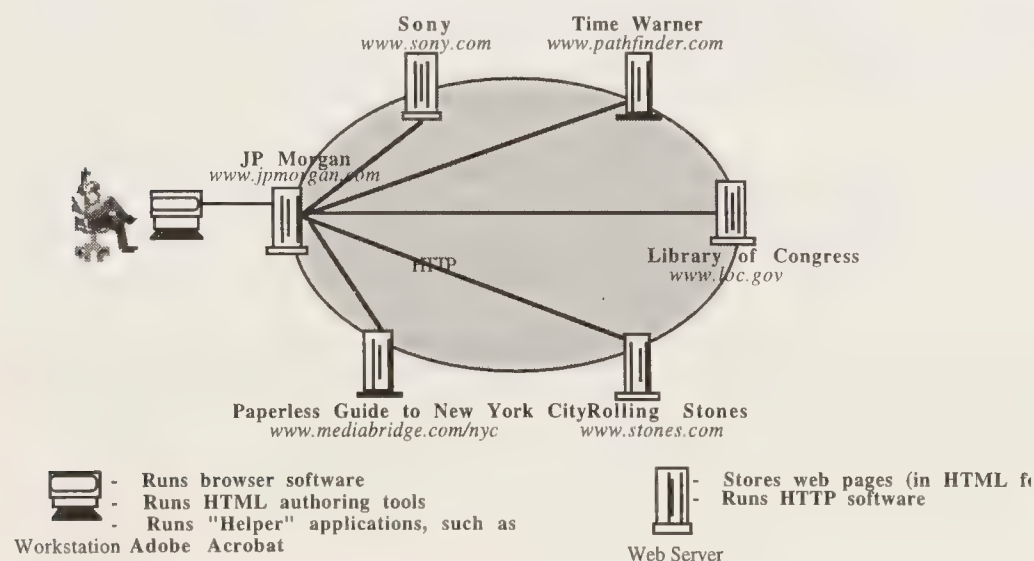
*More technology
acronyms to learn*

Connecting the Global System: The various pages on the Web are connected using software that supports the HyperText Transport Protocol (HTTP). HTTP software manages the communication between the various Web servers, which permits hypertext linking to take place. Software supporting HTTP is available for DOS, Windows, OS/2, Macintosh, and UNIX computers, with commercial versions coming from firms such as *Netscape Communications*, *Spyglass*, *Spry*, and *O'Reilly & Associates*.

The "home" page acts as the starting point to guide users in accessing other documents on Web servers. Each page on the Web has its own unique address, called a Universal Resource Locator (URL). For example, J.P. Morgan's Web server consists of many pages, each with its own URL, but the starting point, or home page address, is <http://www.jpmorgan.com>.

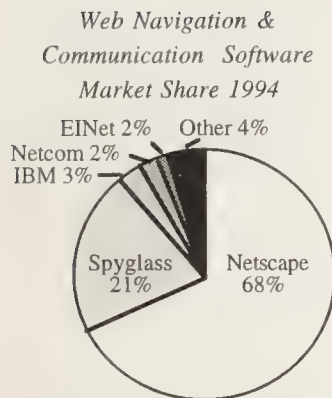
Creating the Content: Pages on the Web are created and formatted using the HyperText Markup Language (HTML). HTML is a language that: formats text, such as bold and italics; includes photos, artwork, sound files, and video clips; and identifies hypertext links, which can connect the page with other Web pages. Chart 3 provides an overview of the relationship of the Web's various components.

Chart 3: Architecture of the World Wide Web



THE BROWSER MARKETPLACE

Browsers are software that is used to access information on the Web and to shelter users from much of the Internet's complexity. The popular Mosaic browser was not the first in the market, but it was the first to provide a graphical user interface and to run on Windows, Macintosh, and UNIX workstations. In much the same way that Microsoft Windows simplifies the use of DOS-based computers, Mosaic makes the Internet easy to use. Initially developed at the *National Center for Supercomputing Applications (NCSA)* at the University of Illinois, Mosaic-based browsers dominate the market, with more than 3 million copies in use today.

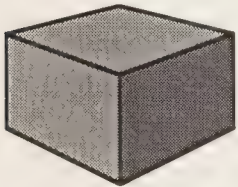


Source: Dataquest

The Netscape Team: Marc Andreessen, one of the lead developers of the Mosaic software, formed Netscape Communications Corp. with Jim Clark, former chairman of Silicon Graphics. Since its inception, Netscape has been aggressively improving its Navigator browser software and its NetSite server product. Also, it has been pushing for security standards and has licensed its technology to firms such as *Silicon Graphics* and *Novell*, and is working with *Mastercard*, *First Data Corp.*, *MCI*, *Bank of America*, and *Wells Fargo* to develop Internet-based transaction processing services.

Work Continues at NCSA: At the same time, work continues on the original NCSA Mosaic. *Spyglass*, as the licensing agent for Enhanced Mosaic, developed at the University of Illinois, has signed agreements with companies such as *AT&T*, *Digital Equipment*, *IBM*, *FTP Software*, *NEC*, *Spry*, and *Quarterdeck*. In addition, *Microsoft*, as a licensee, plans to integrate Web access capabilities into various products and incorporate Mosaic technology into The Microsoft Network.

The Web Goes 3-D



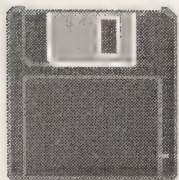
Even with the great interest in the current set of information available on the Web, software development continues in an effort to make the Web more interactive. *Sun Microsystems* and *Silicon Graphics* are currently demonstrating technologies to support 3-D visualization with Web browsers. This capability will permit images to be rotated and viewed from different angles.

Getting Into VRML: The Virtual Reality Modeling Language (VRML) is a standard for providing 3-D graphic interaction on the Web. *Silicon Graphics* is expected soon to provide support for VRML in its WebScape browser. Other companies backing the VRML standard include *Netscape*, *Digital Equipment*, *Template Graphics*, and *NEC*.

An interesting VRML effort is *Waxweb 2.0*, a Web site based on the film "WAX or the discovery of television among the bees." Waxweb contains: 3,000 pages; 25,000 hyperlinks; 85 minutes of digital video; 5,000 color stills; soundtracks in English, French, German, and Japanese; and more than 250 3-D VRML scenes.

Hot Java - A Hot New Technology: *Sun Microsystems* is currently testing its approach to a new class of Web browsers, called Hot Java. This technology is intended to be easily adaptable to support real-time market feeds, 3-D video, and integrated applications.

THE SOFTWARE INDUSTRY REACTS

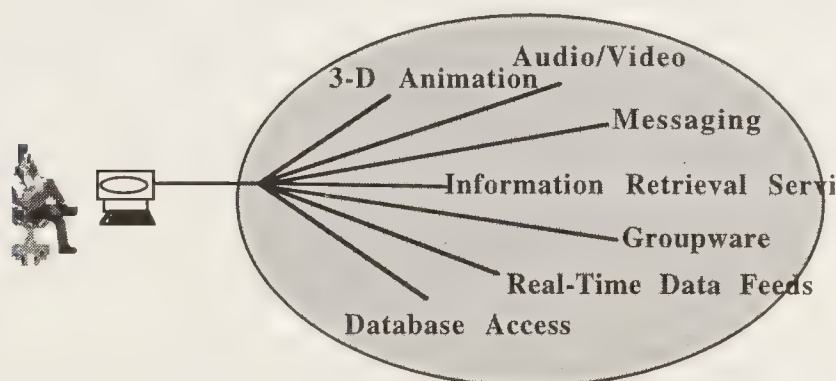


Software developers are designing new products and are adapting current ones to address the needs of this new market. In addition to the Web's linking capabilities, an emerging market exists for authoring tools to assist in creating Web pages, consisting of text and graphics and supporting hypertext links.

Authoring Tools for the Web: Firms such as *Microsoft* and *Novell* are providing tools to convert word processing documents into HTML files and are incorporating browsing capabilities into their products, while *Corel Corp.*, *SoftQuad*, *Quarterdeck*, *Silicon Graphics*, and *Sun Microsystems* are introducing authoring tools to create Web documents.

Reaching Out to Other Computing Environments: We think of the Web as made up of Internet connections, browsers, and server software, but it is becoming an environment of various technologies cooperating together. *IBM*, *Oracle*, and *Sybase* are making their databases accessible on the Web, and soon it will be possible to gain access to the Web from within a standard word processing document. In addition, *Lotus Development* is working to integrate its Notes workgroup product with the Web.

Chart 4: The World Wide Web Reaches Out



Improving Upon the Web With "Helper" Applications: A number of firms are working on applications to extend the Web's capabilities and enhance its functionality.

Adobe Systems' Acrobat technology, which provides users with extensively formatted documents, is already finding use on the Web. New York Times Co., through its *TimesFax* service, is providing daily eight-page news reports in Acrobat. *Adobe* and *Netscape Communications* plan to integrate their technologies in future product offerings.

Another example of enhancing the Web environment is *Progressive Networks'* RealAudio Player. This technology, currently being tested by the *ABC/Capital Cities* and *National Public Radio*, allows users to choose audio clips from a menu and begin listening to them immediately. The technology also allows audio programs to be accompanied by still pictures or other illustrations.

Table 1 lists software development efforts that address the Web market.

Table 1: Software Developers Address the Web Market

Company	Activity
Adobe Systems Inc. (ADBE)	<ul style="list-style-type: none"> - Announced plans to integrate its electronic authoring and document distribution capabilities with Netscape Communications' software products. - Providing HTML authoring capabilities in its PageMaker product offering. - Adobe Acrobat is used as part of the TimesFax World Wide Web edition of the <i>New York Times</i>.
Corel Corp. (COSFF)	<ul style="list-style-type: none"> - Licensing HTML authoring technology from Intext Corp.
Frontier Technologies Corp.	<ul style="list-style-type: none"> - Introduced SuperWeb, a Web server product, along with their SuperHighway Access browser software.
IBM Corp. (IBM)	<ul style="list-style-type: none"> - Offering WebExplorer, a Web browser, as part of its OS/2 Warp operating system. - Plans to provide DB2 access via the Internet using a new Internet tool called DB2 World Wide Web (DB2 WWW).
Illustra Information Technologies, Inc.	<ul style="list-style-type: none"> - Provides an object-relational database management system supporting multimedia data. - America Online will use its technology in Internet publishing product offerings.
Interleaf Inc. (LEAF)	<ul style="list-style-type: none"> - Introduced Cyberleaf, which streamlines the process of publishing information by converting documents from a variety of word processing applications into Web pages. The product is positioned as a complete HTML production environment.
Lotus Development Corp. (LOTS)	<ul style="list-style-type: none"> - Announced InterNotes, which integrates Notes with the Web and Usenet News groups. InterNotes should allow Notes users to publish Notes applications on the Internet and access Internet data from within Notes.
Microsoft Corp. (MSFT)	<ul style="list-style-type: none"> - Plans to integrate Mosaic and Web access capabilities into various products and incorporate Mosaic technology into The Microsoft Network through a licensing agreement with Spyglass Inc. - Plans to offer Internet Assistant, which allows Word to automatically generate HTML formatted files.
NetManage, Inc. (NETM)	<ul style="list-style-type: none"> - Offers the Websurfer browser as part of its Chameleon Internet kit. - Integrated the company's personal manager software, ECCO, with web browser.
Novell, Inc. (NOVL)	<ul style="list-style-type: none"> - Announced WordPerfect Internet Publisher for Windows, an add-on to WordPerfect 6.1, which allows users to create and view documents on the Internet without learning HTML. - Announced WordPerfect Internet Publisher Pro for Windows, which provides seamless connectivity to the Internet from within WordPerfect 6.1. - Developing a browser, code-named Corsair, for accessing various networked services, including the Internet and the Web.
O'Reilly & Associates Inc.	<ul style="list-style-type: none"> - Provides WebSite, a Web server for Windows NT 3.5 and Windows 95.
Oracle Corp. (ORCL)	<ul style="list-style-type: none"> - Announced the World Wide Web Interface Kit for integrating Oracle7 databases with Web servers. - Announced Oracle Book 2.2, document publishing software for creating and distributing multimedia documents across the Web via an HTML converter.
Process Software Corp.	<ul style="list-style-type: none"> - Provides a Web server product for Windows NT platform which runs on Intel and DEC's Alpha RISC processors.
Quarterdeck Corp. (QDEK)	<ul style="list-style-type: none"> - Plans to offer WebAuthor, an HTML authoring tool for Word for Windows 6.0. - Licensing Spyglass's Mosaic for inclusion in connect to the Internet called Quarterdeck Internet Toolbox. - Developing WebServer for Windows targeted at small businesses and Web developers.
SoftQuad, Inc. (SKI)	<ul style="list-style-type: none"> - Provides an HTML authoring tool called HoTMetal Pro.
Sybase, Inc. (SYBS)	<ul style="list-style-type: none"> - In strategic alliance with Silicon Graphics to provide integration between SQL Server and SGI's WebFORCE product offering.
Wall Data Inc. (WALL)	<ul style="list-style-type: none"> - Announced Rumba for the Internet, a Windows-based Internet access and navigation product.

Source: J.P. Morgan Securities Inc.

GETTING CONNECTED: THE ACCESS PROVIDERS



An industry debate exists on the effect the Web will have on the online information service providers, such as **America Online**, **CompuServe**, and **Prodigy**. In the short term, demand for these organizations to support Web access is apparent. Table 2 provides an overview of the steps being taken to provide access by a number of the players in this market.

Although browser software makes navigating the Web very easy, installing and configuring software to connect to the Internet, along with locating information on the Web can be difficult. In addition, much of the information on the Web is still available for free; over time, this will change. In this light, online services will likely evolve into organizations that provide customers with the software, services, and consolidated billing to gain access to information in their own proprietary environments, but with an increasing shift toward providing access to information on the Web. We view these services as we view participants in the cable industry: as information access providers with standard rate, premium, and pay-per-use packages for access to the Web.

Table 2: Online Access Providers Connect to the Web

Company	Activity
America Online (AMER)	<ul style="list-style-type: none"> - Plans to support Web access in spring 1995 based on technology from Booklink Technologies Inc. - Acquired Navisoft, Inc for its electronic publishing software.
AT&T Corp. (T)	<ul style="list-style-type: none"> - Plans to sell a commercial version of the browser for use on the networks of other service providers. - Will introduce Internet access service, Interchange, during summer 1995.
Bolt, Beranek & Newman, Inc. (BBN)	<ul style="list-style-type: none"> - Focusing on producing Internet access services through its BBN Planet subsidiary. - Acquired Internet service providers, NEARnet (northeast US), BARRnet (west coast), and SURAnet (Southeast). - Will provide network services to America Online.
IBM Corp. (IBM)	<ul style="list-style-type: none"> - Providing access to the Internet via its Advantis network. OS/2 Warp includes Web Explorer software.
CompuServe Information Service (HRB)	<ul style="list-style-type: none"> - Will expand its Internet service to support Web access this summer. The company acquired Spry Inc., developers of Internet in a Box and Mosaic in a Box.
Delphi Internet Services Corp.	<ul style="list-style-type: none"> - Signed a license and distribution agreement with Netscape Communications for browser and server software.
MCI Communications Corp. (MCI)	<ul style="list-style-type: none"> - Provides Internet access service and licenses technology from Netscape Communications.
Microsoft Corp (MSFT)	<ul style="list-style-type: none"> - Plans to incorporate Web access into its online service, the Microsoft Network by year end. Has licensed Mosaic technology from Spyglass.
NETCOM On-Line Communication Services Inc. (NETC)	<ul style="list-style-type: none"> - Provides NetCruiser, a Web browser developed by Moon Valley Software, as part of its Internet access offering.
Performance Systems Inc.	<ul style="list-style-type: none"> - The company leaves the choice of browsers to its users, but with its acquisition of Pipeline, an Internet service, it has access to Pipeline's browser software.
Prodigy	<ul style="list-style-type: none"> - Currently provides access to the Web. - Plans to release a new design of its services, called P2, based on HTML.
UUNet Technologies Inc.	<ul style="list-style-type: none"> - Provides Internet Access services. - Building network to connect Microsoft Network users to Internet.

Source: J.P. Morgan Securities Inc.

FINDING WHAT YOU NEED: INFORMATION RETRIEVAL



The proliferation of Web sites presents us with vast amounts of information, literally at our fingertips. How do we find what we need? With traditional (structured) databases, numerous tools exist to access information. But being online no longer means just requesting data from transaction databases. Today, news (*New York Times*, *San Jose Mercury*), weather maps (*MIT*), SEC filings (*Internet MultiCasting Service*), and samplings of music recordings (*Sony*) are among the many types of information available on the Web.

The Need for New Tools: How does a user find information among the unstructured multimedia documents scattered around the world? With the amount of information increasing rapidly, there is a tremendous need for tools that assist in searching for relevant information. Table 3 presents an overview of a number of firms taking on this task.

Challenges for Growth: Although the opportunity for these companies is easily understood, the solutions are not. To address a larger market of potential users and consumers for searching tools, participants in this segment face a number of challenges. They must educate the market about how their products work and must develop product comparison criteria for use in decisions about what to purchase. These firms must also help the market better understand how their products are positioned: as pure technology for incorporation into other systems, as "shrink wrapped" offerings, or as products to implement online search services.

Table 3: Companies in the Information Searching Game

Company	Activity
<i>Architext Software</i>	- Provides text management tools supporting intelligent concept-based retrieval and sophisticated interactive browsing.
<i>ConQuest Software, Inc.</i>	- Announce NetQuest, for release in late 1995 which will search multiple Internet information sources. - Products are on using plain English queries for text retrieval.
<i>Fulcrum Technologies, Inc.</i> (FULCF)	- Announced Fulcrum Surfboard, a search and retrieval server engine optimized for the Internet based on technology from the company's SearchServer product. - Company's technology was selected by Microsoft for use in the Microsoft Network.
<i>InfoSeek Corp.</i>	- Provides an information search service on the Web, accessing articles from computer publications, Internet news groups, and World Wide Web pages. - Information on InfoSeek includes Business Wire, Computerworld, NewsBytes, Computer Select, InfoWorld, Reuters, and Associated Press.
<i>Open Text Corp.</i>	- In partnership with UUNET Canada, Inc., the company provides the Open Text Web Index, a full text search tool for the Web. - The company's technology has been licensed by <i>Oracle Corp.</i>
<i>Personal Library Software Inc.</i>	- Shipping an Internet search engine. PLWeb, which supports capabilities for simultaneous search and retrieval of Internet information, such as Web database, along with searching information on local CD-ROMs. - <i>America Online</i> , a PLS customer, will integrate the PLWeb product with BookLink technology.
<i>Verity Inc.</i>	- Its Topic Information Server is a Web server incorporating the Verity full-text search engine. - Joint development with <i>Spyglass Inc.</i> to add a search engine interface to the Enhanced Mosaic browser. - Working with <i>Interleaf Inc.</i> to support the Cyberleaf HTML.
<i>WAIS Inc.</i>	- Develops and markets the WAISserver and creates custom online services for publishers such as <i>Encyclopedia Britannica</i> , <i>Dow Jones</i> , and <i>CMP Publications</i> . - <i>Encyclopedia Britannica</i> announced an agreement with WAIS Inc. in which both companies will market new searching technology to improve information retrieval on the Internet.
<i>YAHOO</i>	- A popular online guide to the Internet. Recently received funding by Sequoia Capital.

Source: J.P. Morgan Securities Inc.

THE ELECTRONIC COMMERCE GAME



Doing business online has received attention for its potential and its shortcomings. The ability to go online gives the seller global reach, allows electronic tracking of transactions and of "window shoppers," and provides an interactive real-time marketing experience. The most frequently discussed shortcoming is the lack of security.

Setting Up Shop: Getting into the electronic commerce game can be as simple as publishing a home page on a Web site for advertising purposes, or as complex as implementing your own service and engaging in advertising, interactive marketing, customer support, and processing electronic transactions. Many firms are establishing themselves to provide a wide array of services to allow businesses to use the Web for commercial purposes. See Table 4 for a list of some of the major service providers in this market.

Table 4: Competitors in Electronic Commerce

Company	Activity
<i>Cybercash, Inc.</i>	<ul style="list-style-type: none"> - A start-up by Dan Lynch, (father of Interop), RSA Data Security, and Bill Melton (founder of Verifone); the venture will build a gateway between the Internet and the Verifone network. - Working with Wells Fargo on a system to encrypt credit card data.
<i>DigiCash BV</i>	<ul style="list-style-type: none"> - System lets users download digital e-cash from a bank onto their computers for use in purchasing products. Uses an encryption method that makes the transaction anonymous. - Founded by David Chaum, a former computer science professor at the University of California at Berkeley.
<i>First Virtual Holdings, Inc.</i>	<ul style="list-style-type: none"> - Venture backed by Electronic Data Systems and First USA to provide secure purchasing transactions over the Internet.
<i>Microsoft Corp.</i> (MSFT)	<ul style="list-style-type: none"> - Working with Visa to provide online transaction services. - Pursuing acquisition of Intuit, Inc.
<i>Netscape Communications Corp.</i>	<ul style="list-style-type: none"> - Building encryption and validation into its Web software; working with <i>Mastercard, First Data Corp., MCI, Bank of America</i>, and <i>Wells Fargo</i> to develop Internet-based transaction processing services. - Times Mirror Co., Knight-Ridder Inc., Hearst Corp., Adobe Systems Inc., and TCI Technology Ventures, have taken an equity stake in the company.
<i>Open Market, Inc.</i>	<ul style="list-style-type: none"> - Developed an infrastructure that supports commerce on the Internet and the Web. - Will provide software and services to Tribune Company, Advance Publications and Time Inc. to distribute content and conduct business on the Internet. Tribune Company and Advance Publications Inc. have announced investments in the company.

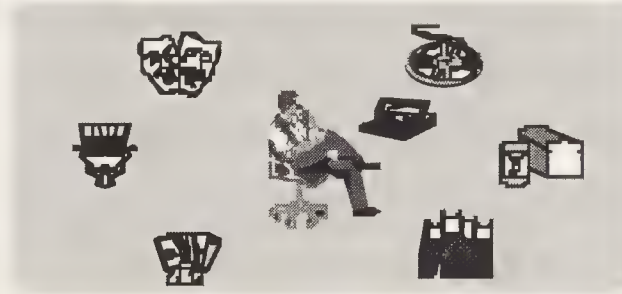
Source: J.P. Morgan Securities inc.



Securing the Web: The issue of providing data security to protect confidential information (i.e., credit card and financial records) has been brought to center stage as the interest for pursuing electronic commerce and banking/transaction activities continues to grow. Mechanisms for authentication, which ensures that information sent on a network has not been altered, and encryption, which makes data unreadable without the use of a password or electronic key, are the key technologies for providing data security.

Until recently two initiatives dealt with data security. Netscape Communications' initiative was based on security socket layer technology; and the Secure-HTTP (HyperText Transfer Protocol) initiative was being pursued by *Terisa Systems* (a joint venture between *RSA Data Security Inc.* and *Enterprise Integration Technologies Corp.*). As announced in early April, *America Online*, *CompuServe*, *IBM*, and *Netscape* agreed to invest in *Terisa Systems*. This should result in consolidation of the two standards and increase the ability to pursue electronic transactions across the various business service offerings. Firms previously working with Terisa include *CyberCash Inc.*, *Open Market Inc.*, *O'Reilly & Associates*, *Spry Inc.*, *Spyglass Inc.*, and *Verity Inc.*

Chart 5: A World of Possibilities



While Appendix I provides a listing of technology firms that have gone online with the Web and Appendix II provides a selection of other interesting sites to visit, the Web provides a universe of possibilities as diverse as our own interests.

APPENDIX I: A SAMPLING OF TECHNOLOGY COMPANIES ON THE WEB

Company Name World Wide Web Address	Market Cap (\$MM)	Product Focus/Recent Developments
3Com Corp. (COMS) www.3com.com	3,488	- Develops, manufactures, and sells internetworking products, e.g., routers, hubs, and adapter boards.
Adobe Systems, Inc. (ADOBE) www.adobe.com	3,378	- Develops, markets, and supports computer software products and technologies to create, display, print, and communicate electronic documents.
Altera Corp. www.altera.com	1,701	- Developer of high-performance, high-density programmable logic devices and associated computer-aided engineering logic development tools.
Apple Computer Inc. (AAPL) www.apple.com	4,570	- Offers a product line of workstations and servers. In partnership with IBM and Motorola to develop the PowerPC chip.
Architext Software www.architext.com	*	- Develops concept-based information retrieval technology.
Ascend Communications, Inc. (ASND) www.ascend.com	912	- Manufactures, markets, and supports a broad range of high-speed WAN access products.
AT&T (T) www.att.com	79,627	- Develops and markets a wide product range, from laptops to massively parallel machines, via NCR.
Bay Network, Inc. (BNET) www.bnet.com	3,784	- Develops high-performance network products, e.g., intelligent hubs and ATM switches, along with network management tools.
Bolt Beranek & Newman, Inc. (BBN) www.bbn.com	321	- Focuses on areas ranging from basic technology research to Internet service providers.
Borland International, Inc. (BORL) www.borland.com	258	- Develops and markets tools for software developers.
Cabletron Systems. (CS) www.ctrn.com	3,378	- Develops network hubs, switches, adapter boards, and network management products. Recently introduced MMAC-Plus to position it in the high-performance Ethernet and ATM switching markets.
Cisco Systems (CSCO) www.cisco.com	11,032	- Develops and markets multiprotocol routers (in which it is the market leader), along with terminal servers and network management tools. Products address high and low ends of the market.
Compaq Computer Corp. (CPQ) www.compaq.com	9,886	- Offers a wide range of workstation and server products based on the Intel line of microprocessors.
Computer Associates International, Inc. (CA) www.cai.com	10,980	- Develops a wide variety of software products for mainframe, workstation, and client/server environments.
ConQuest Software Inc. www.esdim.noaa.gov:8080/	*	- Working with Microsoft to promote the company's Unicenter network management product.
Dallas Semiconductor (DS) www.dalsemi.com	512	- Announced the NetQuest system (available in late 1995) for publishing, accessing, and disseminating information across the Internet.
Dell Computer Corp. (DELL) www.dell.com	2,091	- Develops, manufactures, and markets high performance CMOS integrated circuits and semiconductor-based subsystems.
Digital Equipment Corp. (DEC) www.dec.com	2,091	- Designs and markets a line of Intel-based workstations and servers.
Farallon Computing, Inc www2.farallon.com	6,453	- Develops products based on the Alpha chip and provides systems integration development services.
Fulcrum Technologies Inc. (FULCF) www.fultech.com	*	- Develops and sells a family of networking software and systems for Windows and Macintosh computers, including Ethernet and LocalTalk adapters, hubs, router/gateways, and network management and communications software.
Frontier Technologies Corp. www.frontiertech.com	127	- Introduced Surfboard, the search and retrieval server engine optimized for the Internet based on the companies core SearchServer technology.
FTP Software (FTPS) www.ftp.com	*	- Develops and markets networking software for the TCP/IP market.
Global Village Commun., Inc. (GVIL) www.globalcenter.net	566	- Designs, develops, markets, and supports TCP/IP-based networking software products.
Gupta Corp. (GPTA) www.gupta.com	201	- Designs, develops, and manufactures modems, faxes, and ISDN cards.
Harris Corp.(HRS) www.harris.com	133	- Provides a LAN-based SQL database along with SQL Windows, one of the first client-server development tools.
	1,828	- Focuses on four major businesses: electronic systems, semiconductors, communications, and Lanier Worldwide office equipment.

Company Name World Wide Web Address	Market Cap (\$MM)	Product Focus/Recent Developments
Hewlett-Packard Co. (HWP) www.hp.com	16,421	- Develops a variety of hardware and software computing solutions.
IBM Corp. (IBM) www.ibm.com	54,583	- Develops a variety of hardware and software computing solutions. - Providing access to the Internet via its Advantis network. - OS/2 Warp includes Web Explorer software.
Individual, Inc. www.newspage.com	*	- Provides customized news products that searches a broad spectrum of electronic newswires, newspapers, and trade magazines for delivery via electronic mail, Internet/World Wide Web, fax, and Lotus Notes.
Illustra Information Technologies, Inc. www.illustra.com	*	- Supplies object-relational database software and tools for stores to manage and analyze information such as audio, video and images in the same database with traditional data types such as text and numbers, using industry-standard SQL.
Informix Corp. (IFMX) www.informix.com	2,537	- Develops and markets database and application development software.
InfoSeek Corp. www.infoseek.com	*	- Provider of online information retrieval services.
Intel Corp. (INTC) www.intel.com	42,952	- The world's largest chip maker and leading manufacturer of PC networking and communications products.
Interleaf, Inc. (LEAF) www.ileaf.com	76	- Supplies open document management systems, services, and expertise. Recently announced Cyberleaf, a software package for publishing information on the World Wide Web.
Legent Corp. (LGNT) www.legent.com	997	- Supplies software and services for the management of distributed enterprise computing environments.
Lotus Development Corp. (LOTS) www.lotus.com	1,491	- Recently introduced InterNotes to integrate the companies Notes groupware product with the Internet and the Web.
McAfee Associates (MCAF) www.mcafee.com	354	- Develops and markets antivirus and network security management software.
Microchip Technology, Inc. (MCHP) www.ultranet.com/biz/mchip	916	- Develops, manufactures, and markets programmable 8-bit micro controllers and related specialty products for the consumer, automotive, and office automation, communications, and industrial markets
Microsoft Corp. (MSFT) www.microsoft.com	46,255	- Develops and markets a variety of computing software solutions.
Motorola, Inc. (MOT) www.motorola.com	33,386	- Provides wireless communications, semiconductors, and advanced electronic systems and services.
National Semiconductor Corp.(NSM) www.nsc.com	2,855	- Focuses on three key areas: communications, analog-intensive, and personal systems.
NEC Corp. (NIPNY) www.nec.com	16,981	- Supplies communication, computing, and semiconductor equipment.
Netcom On-Line Communications Services, Inc. (NETC) www.netcom.com	167	- Provides local access points to the Internet in U.S. metropolitan areas. Provides NetCruiser Web browser as part of the service offering.
NetManage, Inc. (NETM) www.netmanage.com	1,445	- Develops, markets, and supports an integrated set of internetworking applications and development tools for Microsoft Windows based on TCP/IP.
Netscape Communications Corp. www.netscape.com	*	- Developing software products to improve access to Internet-based information services.
Newbridge Networks Inc. (NN) www.vivid.newbridge.com	1,504	- Develops and markets multiplexers, ATM switches, and network management software products.
NeXT Computer www.next.com	*	- Developer of NeXTStep. Recently, ported to Intel environment.
Nippon Telegraph and Telephone Corp. www.ntt.jp	138,840	- NTT and its subsidiaries provide Japan's broad range of telecommunications services, including telephone, telegraph, leased circuit, data communication facility, and miscellaneous services. Also sells terminal equipment.
Novell, Inc. (NOVL) www.novell.com and www.wordperfect.com	8,088	- Develops and markets a variety of software solutions including Netware and WordPerfect.
O'Reilly & Associates www.ora.com	*	- Publisher of books for UNIX, X, TCP/IP, and other open systems, and is a pioneer in online publishing on the Internet.
Open Market www.openmarket.com	*	- Develops and markets software, services, and custom solutions to facilitate electronic commerce on the Internet and the World Wide Web.
Opentext Corp www.opentext.com	*	- Developer of information retrieval technology, which is licensed by Oracle Corp.

Company Name World Wide Web Address	Market Cap (\$MM)	Product Focus/Recent Developments
Oracle Systems Corp. (ORCL) www.oracle.com	12,810	- Develops and markets relational databases supported on a wide range of technology platforms, from PC to mainframe.
Personal Library Software, Inc. www.pls.com	*	- Shipping an Internet search engine, PLWeb. - Provides search technology to America Online, Apple's E-world service and others.
Progress Software Corp.(PRGS) www.progress.com	247	- A supplier of client/server application development and deployment software.
Process Software Corp. www.process.com	*	- Provider of TCP/IP-based solutions and Web server product for Windows NT running on Intel platforms, as well as DEC's Alpha RISC processors.
Quarterdeck Office Systems Inc (QDEK) www.qdeck.com	138	- Develops software in the memory management, X. Windows and Internet access.
Rocket Science www.rocketsci.com	*	- Developing interactive content across a range of video-game and PC platforms, cable-set boxes, and other delivery media.
RSA Data Security, Inc. www.rsa.com	*	- Develops and markets in cryptographic technologies; used in many software products, e.g., Apple System 7 Pro, Novell NetWare, Lotus Notes, Microsoft Windows for Workgroups, and WordPerfect InForms.
Santa Cruz Operation Inc. (SCOC) www.sco.com	389	- Developer of UNIX operating systems software for Intel-based workstations and servers.
SAS Institute www.sas.com	*	- Produces an integrated suite of software products for enterprise-wide information delivery.
Sequent Computer Systems Inc. (SQNT) www.sequent.com	513	- Develops and markets scalable computing systems that support enterprise-wide applications running on the UNIX and Microsoft Windows NT operating systems.
Shiva Corp. (SHVA) www.shiva.com	368	- Develops products for Windows(TM), DOS, Macintosh, and UNIX environments, which are optimized for remote access.
Silicon Graphic Inc. (SGI) www.sgi.com	5,326	- Designs, manufactures, and markets high-end workstations used to analyze complex 3-D objects and perform data visualization processing. Currently moving into parallel systems design.
Spry, Inc. www.spry.com		- Develops and markets software for the TCP/IP and Internet markets. Acquired by CompuServe.
Spyglass, Inc. www.spyglass.com	*	- Develops and distributes its Enhanced Mosaic for Windows, Macintosh, and X Window System computers, under an agreement with the University of Illinois. Has licensed this software to AT&T, Digital Equipment, FTP Software, IBM, Microsoft, and NEC.
Starlight Networks www.starlight.com	*	- Develops and markets video server software products.
Sun Microsystems Inc. (SUNW) www.sun.com	3,887	- Develops and markets the Netra line of servers for PC networks, various UNIX workstations and the Solstice network management system. - Introduced the Hot Java Web browsing technology.
Sybase Inc. (SYBS) www.sybase.com	1,258	- Provide client-server products in the areas of databases, tools, database management systems, and interoperability.
Symantec Corp. (SYMC) www.symantec.com	833	- Develops and markets application and system software for Windows, DOS, Macintosh, and OS/2.
Taligent, Inc. www.taligent.com	*	- Independent software company owned by Apple Computer, Hewlett-Packard, and IBM. Developing a new application system based on object-oriented technology.
Tandem Computer Inc. (TDM) www.tandem.com	1,476	- Announced its CyberWeb family of electronic commerce solutions, the result of a joint effort with Open Market Inc., Atalla, and UB Networks. CyberWeb products include software and hardware choices to provide highly reliable World Wide Web services. The company is also working with Netscape and Verity, Inc..
Terisa Systems, Inc. www.terisa.com	*	- Develops toolkits that make secure Internet transactions possible with a security-enhanced version of HTTP. A joint venture of RSA Data Security (RSA) and Enterprise Integration Technologies (EIT).
Texas Instruments, Inc. (TXN) www.ti.com	9,731	- Engaged in the development, manufacture, and sale of electrical and electronic products for industrial, government, and consumer markets.
TGV, Inc. (TGVV) www.tgv.com	94	- Develops and markets TCP/IP software solutions for DEC and Windows environments.
Thinking Machines Corp. www.think.com	*	- Designs and manufactures highly parallel supercomputers, such as the CM-5.
Tivoli Systems, Inc. (TIVS) www.tivoli.com	508	- Develops systems management services that will be supported by SunSoft, UNIX Systems Labs, Sybase, and Open Systems Foundation.
UUNET Technologies Inc. www.alter.net	*	- Provides commercial Internet services. Recently announced a relationship with Microsoft to support connectivity to The Microsoft Network.

Company Name World Wide Web Address	Market Cap (\$MM)	Product Focus/Recent Developments
Verity, Inc. <i>www.verity.com</i>	*	- Develops and markets information agent products to filter, search, retrieve, analyze, and navigate information sources. Technology is used by Adobe Systems, Lotus Development, Frame Technology, Documentum, Action Technologies, Collabra Software, Saros, and Odesta Systems.
VocalTec, Inc. <i>www.vocaltech.com</i>	*	- Develops and markets Internet Phone, a software product which uses the Internet to support real-time communication.
WAIS, Inc. <i>www.wais.com</i>	*	- Develops and markets server technology to support interactive publishing on the Internet.
Xerox Corp. (XRX) <i>www.xerox.com</i>		- Develops and markets a broad array of products targeted at the business office market.
Xilinx, Inc.(XLNX) <i>www.xilinx.com</i>	1,804	- Supplier of CMOS programmable logic and related development system software.
YAHOO <i>www.yahoo.com</i>	*	- On-line directory of information on the Web.
Zilog, Inc. (ZLOG) <i>www.zilog.com/zilog</i>	680	- Designs, manufactures and markets application specific standard products (ASSPs) for the consumer electronics, computer peripherals, and data communications market.

Source: Factset.

Note: Market capitalization data as of 5/02/95 *Privately held.

APPENDIX II: A FEW OTHER INTERESTING SITES ON THE WEB

Organization Name World Wide Web Address	Product Focus/Recent Developments
Encyclopedia Britannica, Inc. <i>www.eb.com</i>	- Britannica Online is a fully searchable and browsable collection of authoritative references, including Britannica's full encyclopedic database, Merriam-Webster's Collegiate Dictionary (Tenth Edition), and the Britannica Book of the Year.
The European Laboratory for Particle Physics. <i>www.cern.ch</i>	- Organization where the World Wide Web was originally developed.
MIT <i>www.mit.edu/stocks</i>	- An experimental service providing stock market information.
New York University EDGAR Project <i>www.edgar.stern.nyu.edu</i>	- Site where SEC documents can be obtained.
Paperless Guide to New York City <i>www.mediabridge.com/nyc/</i>	- Mediabridge Infosystems Inc. provides information on the city's offerings.
Rolling Stones <i>www.stones.com</i>	- Information on Voodoo Lounge, etc.
The Internet Society <i>www.isoc.org</i>	- A nongovernmental international organization for global cooperation and coordination for the Internet and its internetworking technologies and applications.
Time Warner <i>www.pathfinder.com</i>	- Time Warner's site on the Internet.
W3 Consortium <i>www.w3.org</i>	- Coordinates the development of standards for the World Wide Web.
White House <i>www.whitehouse.gov</i>	- Yes, where the Clinton's live.

APPENDIX III: TERMS TO KNOW

Archie	- System for searching indices of files available on public servers by anonymous FTP on the Internet.
Authentication	- A data security mechanism that ensures the integrity of a message that has been received (e.g., guarantees that nothing was altered during the transmission) but does not scramble the message to make it unintelligible to others .
Client	- A computer, typically a PC or workstation, that receives information from another computer.
Client-server	- An architecture in which there is interaction between two or more computers. The client requests services from the server.
Common Gateway Interface (CGI)	- A specification to allow Web server to communicate with other programs and systems.
Data Encryption Standard (DES)	- An encryption standard supported by the federal government that has become a standard in industry as well.
Distributed Computing	- An environment in which work is performed on more than one computer and a communications network is required. A more accurate description of the current direction computing technology is moving.
Distributed Database	- A database in which information is stored on more than one physical hardware server.
Encryption	- A data security mechanism used to scramble messages (e.g., convert information into a format which is unreadable without the use of a password or key). Encryption insures that no unauthorized person can read the message; it does not insure that the message has not been altered during transmission (see authentication).
File Transfer Protocol (FTP)	- A method for file transferring on the Internet.
Graphics Interface Format(GIF)	- Format for storing images (pictures, drawings, etc.)
Graphic User Interface (GUI)	- A PC and workstation user interface popularized by the Apple Macintosh and Microsoft Windows for accessing application functions. GUIs typically utilize windows, icons, and pull-down menus, and are operated with a mouse or keyboard.
Groupware	- A class of software that supports the sharing of information between two or more people. The range of products is diverse and includes electronic mail, bulletin boards, scheduling, and conferencing. Lotus <i>Notes</i> is the most prominent product in this category.
Home Page	- The Web page which is used as a starting (or entry) point to a Web server. J.P. Morgan's home page is www.jpmorgan.com .
Hypertext Markup Language (HTML)	- A language use to format the documents which make up the Web.
HyperText Transfer Protocol (HTTP)	- The rules (or protocol) for providing communications between a Web server and clients such as browsers.
Internet	- A global collection of computer networks permitting universities, corporations, government agencies and research institutions to communicate and share information. Often referred to in connection with the concept of the information highway.
Multipurpose Internet Mail Extensions (MIME)	- An Internet standard for incorporating multimedia information in electronic mail.
Mosaic	- A type on Internet browsing technology providing supported on a variety of graphic interface platforms including MS Windows, Apple Macintosh and X Windows.

Newsgroups	- A bulletin board-like system where information can be posted on a particular subject.
Network News Transport Protocol (NNTP)	- A standard used in the transmission of Usenet messages.
Open System	- Used to describe computing environments that have published technical specifications which will: 1) permit third parties to build add-on products and services; or 2) allow for the easy interchange of components. This term is frequently associated with the UNIX environment, along with standards published by a variety of organizations.
Open Systems Foundation (OSF)	- A not-for-profit organization with the goal of producing licensed implementations of standardized software. Its membership consists of most of the world's major computer systems vendors.
Point-to-Point Protocol (PPP)	- A protocol which allows a computer to use TCP/IP with standard telephone lines and high speed modems.
Scalability	- The ability to increase and/or expand the power or capabilities of a technology without requiring changes to a customer's software.
Secure HyperText Transport Protocol (S-HTTP)	- An extension to HTTP which provides security features for use in communications and performing transactions.
Server	- A computing device that provides services to other computers. These services include access to disk drives, databases, and communication devices. Servers include workstations, minicomputers, and mainframes.
Simple Mail Transport Protocol (SMTP)	- A protocol that describes how electronic mail is moved between users in a TCP/IP network.
Simple Network Management Protocol (SNMP)	- A protocol which describes how information is sent from devices on a network such as hub, routers, switches, and computers to the applications programs which monitor and manage them.
Telnet	- A terminal Emulation protocol for programs that provide access to computers on the Internet.
Transmission Control Protocol/Internet Protocol (TCP/IP)	- A standard communications protocol commonly used in UNIX networks. It is the communication protocol of the Internet.
(Uniform Resource Locator) URL	- An address which specifies the location of a Web page.
Usenet	- A collection of thousand of newsgroups (bulletin boards) available on the Internet. The information is sorted by topics of interest.
WAIS	- Wide Area Information Server. Software used to index text files in servers.

